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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/065,874

11/27/2002

Chia-Tien Peng

9788-US-PA

5275

31561

7590

07/12/2004

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE  
7 FLOOR-1, NO. 100  
ROOSEVELT ROAD, SECTION 2  
TAIPEI, 100  
TAIWAN

EXAMINER

FULLER, ERIC B

ART UNIT

PAPER NUMBER

1762

DATE MAILED: 07/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/065,874	PENG, CHIA-TIEN	
	<b>Examiner</b>	<b>Art Unit</b>	
	Eric B Fuller	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 May 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5, 7-16 and 18-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-16 and 18-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 28, 2004 has been entered.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-5, 7-16, and 18-22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

The claims require that the polysilicon layer is formed with greater grain size due to lower thermal conductivity of the porous material layer. The scope of these claims is vague and confusing, as it is not known what the grain size needs to be greater than

and what the thermal conductivity need to be lower than in order to satisfy the limitations of the claim. The description fails to make light of this issue, and thus the claims fail to comply with the written description requirement.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-5, 7-16, and 18-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The scopes of these claims are unclear, as discussed above. Specifically, it is not understood if the grain sizes are required to be larger than processes that use non-porous buffer layers, no buffer layers, porous layers of the prior art, etc. It is not understood what grain values read on the applicant's claims. It is also not understood what thermal conductivity is required to read on at least the independent claims.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5, 7-14, 16, and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217) and Havemann et al. (US 5,747,880), and further in view of Campion et al. (US 6,201,917 B1).

The applicant teaches in paragraphs [0005] – [0008] that the prior art conventionally provides a substrate, forms a barrier layer of silicon nitride by CVD, forming a stress buffer layer of silicon oxide on the barrier layer by CVD, thus together forming a buffer layer. An amorphous silicon layer is formed on top of the buffer layer and irradiated with an excimer laser annealing process in order to form a polysilicon layer. As it is taught that porous material layer is the improvement over the prior art, the applicant's admitted prior art does not teach to form a porous material layer.

However, Kanaya teaches that by depositing an insulating layer with a relatively low thermal conductivity before the amorphous silicon layer, the thermal energy imparted by the laser is prevented from being dissipated, which results in the polysilicon layer having more uniform grain diameters (column 4, lines 55-53; abstract). The insulating layer is made of silicon oxide or the like (column 4, lines 45-50). From this, one of ordinary skill in the art would recognize that the lower the thermal conductivity of the insulating layer is, the less thermal energy is dissipated, thus increasing the uniformity of the grain diameters. The reference is silent to using a porous material as the insulating layer.

However, Havemann teaches that porous silicon oxide has a lower thermal conductivity than solid silicon oxide. Porous silicon oxide obviously qualifies as "silicon

oxide or the like", as taught by Kanaya. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize porous silicon oxide as an insulating layer. By doing so, the uniformity of the grain diameters is increased. To use the insulating layer on top of the stress buffer layer reads on claim 10 and to use the insulating layer as the stress buffer layer reads on claim 1. To use either configuration would have been equally obvious with the expectation of achieving similar results, as the stress barrier layer and the insulating layer are both made of silicon oxide and therefore both possess stress buffer properties.

As the thermal conductivity of porous silicon oxide is less than solid silicon oxide, it inherently must be within the applicant's claimed range.

The applicant's admitted prior art, in view of Kanaya and Havemann, fails to teach aluminum oxide being included in the porous layer. However, it is taught by Havemann that porous silicon oxide has less mechanical strength than solid silicon oxide and there exists a need to strengthen the porous silicon oxide (column 2, lines 50-55). Campion teaches increasing the strength of silicon oxide by doping it with aluminum oxide in the range of 100 ppm to 1000 ppm. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to dope the porous silicon oxide layer with aluminum oxide in the amount taught. By doing so, the mechanical strength of the porous silicon oxide is increased.

The proposed combination reads on at least having a greater grain size than a process without a barrier layer, which is sufficient to read on the applicant's claims.

As to claims 21 and 22, Kanaya teaches the thickness of the insulating layer is within the applicant's range. To use a thickness within the applicant's range would have been obvious at the time the invention was made to a person having ordinary skill in the art with a reasonable expectation of success, as Kanaya teaches similar ranges as being useful in the art.

Claims 4 and 15 rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US 6,025,217), Havemann et al. (US 5,747,880), and Campion et al. (US 6,201,917 B1), as applied to claims 1 and 10 above, and further in view of Haven et al. (US 6,380,670).

The applicant's admitted prior art in view of Kanaya, Havemann, and Campion teach the limitations of claims 1 and 10, as shown above. The combined references are silent to teach the deposition method of the porous silicon oxide layer. However, Haven teaches that porous silicon oxide may be deposited by e-beam evaporation. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to deposited the porous silicon oxide by e-beam evaporation. By doing so, one would have a reasonable expectation of success, as the combined references teach to deposit the porous silicon oxide and Haven teaches a method by which this may be done.

Claims 1-3, 5, 7-14, 16, and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Kanaya et al. (US

6,025,217) and Numata (US 5,519,250), and further in view of Campion et al. (US 6,201,917 B1).

The applicant teaches in paragraphs [0005] – [0008] that the prior art conventionally provides a substrate, forms a barrier layer of silicon nitride by CVD, forming a stress buffer layer of silicon oxide on the barrier layer by CVD, thus together forming a buffer layer. An amorphous silicon layer is formed on top of the buffer layer and irradiated with an excimer laser annealing process in order to form a polysilicon layer. As it is taught that porous material layer is the improvement over the prior art, the applicant's admitted prior art does not teach to form a porous material layer.

However, Kanaya teaches that by depositing an insulating layer with a relatively low thermal conductivity before the amorphous silicon layer, the thermal energy imparted by the laser is prevented from being dissipated, which results in the polysilicon layer having more uniform grain diameters (column 4, lines 55-53; abstract). The insulating layer is made of silicon oxide or the like (column 4, lines 45-50). From this, one of ordinary skill in the art would recognize that the lower the thermal conductivity of the insulating layer is, the less thermal energy is dissipated, thus increasing the uniformity of the grain diameters. The reference is silent to using a porous material as the insulating layer.

However, Numata teaches that silica aerogel, a sol-gel derived silicon oxide, is very porous and has negligible thermal conductivity. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize silica aerogel in the above mentioned process. By doing so, the uniformity of the



grain diameters is increased. To use the insulating layer on top of the stress buffer layer reads on claim 10 and to use the insulating layer as the stress buffer layer reads on claim 1. To use either configuration would have been equally obvious with the expectation of achieving similar results, as the stress barrier layer and the insulating layer are both made of silicon oxide and therefore both possess stress buffer properties.

The applicant's admitted prior art, in view of Kanaya and Numata, fail to teach aluminum oxide being included in the porous layer. However, Campion teaches increasing the strength of silicon oxide by doping it with aluminum oxide in the range of 100 ppm to 1000 ppm. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to dope the porous silicon oxide layer with aluminum oxide in the amount taught. By doing so, the mechanical strength of the porous silicon oxide is increased.

The proposed combination reads on at least having a greater grain size than a process without a barrier layer, which is sufficient to read on the applicant's claims.

As to claims 21 and 22, Kanaya teaches the thickness of the insulating layer is within the applicant's range. To use a thickness within the applicant's range would have been obvious at the time the invention was made to a person having ordinary skill in the art with a reasonable expectation of success, as Kanaya teaches similar ranges as being useful in the art.

### ***Response to Arguments***

Applicant must discuss the references applied against the claims, explaining how the claims avoid the references or distinguish from them.

Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Applicant's arguments do not comply with 37 CFR 1.111(c) because they do not clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. Further, they do not show how the amendments avoid such references or objections.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (571) 272-1420. The examiner can normally be reached on Mondays through Thursdays.

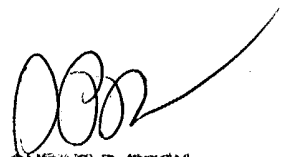
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P Beck, can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1762

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



EBF



SHRIVE P. BECK  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700